

# PATENT APPLICATION FEE DETERMINATION RECORD

Effective December 8, 2004

Application or Docket Number

10/598382

## CLAIMS AS FILED - PART I

SMALL ENTITY  
TYPE ☐

OR

OTHER THAN  
SMALL ENTITY

	(Column 1)	(Column 2)
U.S. NATIONAL STAGE FEES		
BASIC FEE	SMALL ENT. = \$ 150	LARGE ENT. = \$ 300
EXAMINATION FEE	Satisfies PCT-Article 33(1)-(4) = \$ 50 / \$ 100	All other situations = \$ 100 / \$ 200
SEARCH FEE	U.S. Is ISA = \$ 50 / \$ 100 ALL other countries = \$ 200 / \$ 400	All other situations = \$ 250 / \$ 500
FEE FOR EXTRA SPEC. PGS.	minus 100 =	/ 50 =
TOTAL CHARGEABLE CLAIMS	19 minus 20 = *	
INDEPENDENT CLAIMS	4 minus 3 = *	1
MULTIPLE DEPENDENT CLAIM PRESENT		<input type="checkbox"/>

\* If the difference in column 1 is less than zero, enter "0" in column 2

RATE	FEE
BASIC FEE	
EXAM. FEE	
SEARCH FEE	
X \$ 125 =	
X \$ 25 =	
X \$ 100 =	
+ \$ 180 =	
TOTAL	

OR

RATE	FEE
BASIC FEE	300
EXAM. FEE	200
SEARCH FEE	100
X \$ 250 =	
X \$ 50 =	
X \$ 200 =	200
+ \$ 360 =	
TOTAL	800

## CLAIMS AS AMENDED - PART II

SMALL ENTITY

OR

OTHER THAN  
SMALL ENTITY

	(Column 1)	(Column 2)	(Column 3)
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total *	Minus **	=
	Independent *	Minus ***	=
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>		

RATE	ADDITIONAL FEE
X \$ 25 =	
X \$ 100 =	
+ \$ 180 =	
TOTAL ADDIT. FEE	

OR

RATE	ADDITIONAL FEE
X \$ 50 =	
X \$ 200 =	
+ \$ 360 =	
TOTAL ADDIT. FEE	

	(Column 1)	(Column 2)	(Column 3)
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total *	Minus **	=
	Independent *	Minus ***	=
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>		

RATE	ADDITIONAL FEE
X \$ 25 =	
X \$ 100 =	
+ \$ 180 =	
TOTAL ADDIT. FEE	

OR

RATE	ADDITIONAL FEE
X \$ 50 =	
X \$ 200 =	
+ \$ 360 =	
TOTAL ADDIT. FEE	

\* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

\*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than "20", enter "20".

\*\*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than "3", enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

**MULTIPLE DEPENDENT CLAIM  
FEE CALCULATION SHEET**  
(FOR USE WITH FORM PTO-875)

SERIAL NO.

10/ 598382

FILING DATE

APPLICANT(S)

**CLAIMS**

	AS FILED		AFTER 1 <sup>st</sup> AMENDMENT		AFTER 2 <sup>nd</sup> AMENDMENT	
	IND.	DEP.	IND.	DEP.	IND.	DEP.
1	1					
2		1				
3		1				
4		1				
5		1				
6		1				
7		1				
8	1					
9		1				
10		1				
11	1					
12		1				
13		1				
14		1				
15		1				
16		1				
17	1					
18		1				
19		1				
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						
40						
41						
42						
43						
44						
45						
46						
47						
48						
49						
50						
TOTAL IND.	4	↓		↓		↓
TOTAL DEP.	15	←		←		←
TOTAL CLAIMS	19					

	AS FILED		AFTER 1 <sup>st</sup> AMENDMENT		AFTER 2 <sup>nd</sup> AMENDMENT	
	IND.	DEP.	IND.	DEP.	IND.	DEP.
51						
52						
53						
54						
55						
56						
57						
58						
59						
60						
61						
62						
63						
64						
65						
66						
67						
68						
69						
70						
71						
72						
73						
74						
75						
76						
77						
78						
79						
80						
81						
82						
83						
84						
85						
86						
87						
88						
89						
90						
91						
92						
93						
94						
95						
96						
97						
98						
99						
100						
TOTAL IND.		↓		↓		↓
TOTAL DEP.		←		←		←
TOTAL CLAIMS						

U.S. NAT

2L STAGE WORKSHEET

(EO)

U.S. APPL. NO. 10/598382INTERNATIONAL APPL. U/505/006522APPLICATION FILED BY: 20 MOS. OR 30 MOS. ☒ SCREENED BY

## INTERNATIONAL APPLICATION PAPERS IN THE APPLICATION FILE:

- ☒ International application  
☒ Article 19 amendments  
☒ Priority Document(s) No. 1  
☐ Request Form PCT/RO/101  
☐ PCT/IB/302  
☐ PCT/IB/304  
☐ PCT/IB/306  
☐ PCT/IB/308  
☐ PCT/IB/331  
☐ OTHER PCT/IB/  
☐ PCT/PEA/409 also 416

- ☒ 409 annexes to IPER  
☒ PCT/ISA/210 (Search report)  
☐ Search report References  
☐ Other Papers filed

WIPO PUBLICATION  
 PUBLICATION NO. WO/05/084289  
 PUBLICATION DATE 13-SEP-09  
 PUBLICATION LANG. EN  
 NOT PUBLISHED  
 U.S. only Requested

## RECEIVED FROM THE APPLICANT: (other than checked above)

- ☒ National application basic fee paid  
☒ Express Processing Requested  
☒ Translation of the International Application  
☒ Used the IB copy of the IA  
☒ Description  
☒ Claims  
☒ Drawings  
☒ Foreign Language in drawing  
☒ Article 19 Amendments  
☒ Amendment used in application  
☒ Article 34 Amendment  
☒ Amendment used in application  
☒ DNA  
☒ 1194 transaction done

- ☒ Preliminary Amendment(s) filed 25 AUG 2006  
☐ second submission  
☐ Information Disclosure Statement  
☐ second submission  
☐ Assignment  
☐ Forward to Assignment Branch  
☐ Substitute Specification  
☐ Small Entity Statement  
☐ type  
☒ Oath/Declaration (date submitted 25 AUG 2006)  
☒ Not executed  
☒ Executed  
☐ Power of Attorney  
☐ Change of Address

*data sheet*

USC Receipt of Request (PTO-- 1399 Transmittal Letter)

25 AUG 2006

to Acceptable oath/declaration received

25 AUG 2006

(e) Date

to complete 35 USC 371 requirements met

25 AUG 2006

DATE NOTICE COMPLETED

25 AUG 2006

(EO 903) Notice of Acceptance

(EO 905) Notice of Missing Requirements

(EO 917) Notice of A defective oath or declaration

(EO 916) Notice of defective response

10/598382

## PATENT COOPERATION TREATY

## PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY  
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

REC'D 29 MAR 2006

WIPO

PCT

Applicant's or agent's file reference CTSF0151PCT	FOR FURTHER ACTION		See Form PCT/IPEA/416
International application No. PCT/US05/06522	International filing date (day/month/year) 28 February 2005 (28.02.2005)	Priority date (day/month/year) 27 February 2004 (27.02.2004)	
International Patent Classification (IPC) or national classification and IPC IPC: B06J 07/12 USPC: 296/107.16, 108, 117, 134; 29/897.2			
Applicant [JUST ET AL.] CTS Fahrzeug DACHSYSTEME GMBH			
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>4</u> sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input type="checkbox"/> (sent to the applicant and to the International Bureau) a total of ___ sheets, as follows:</p> <p style="margin-left: 40px;"><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p style="margin-left: 40px;"><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p> <p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the report</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input checked="" type="checkbox"/> Box No. VIII Certain observations on the international application</p>			
Date of submission of the demand 14 December 2005 (14.12.2005)		Date of completion of this report 28 February 2006 (28.02.2006)	
Name and mailing address of the IPEA/ US Mail Stop PCT, Attn: IPEA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201		Authorized officer For Eric B. Compton <i>Virginia Liby</i> Telephone No. (571) 272-4300	

Form PCT/IPEA/409 (cover sheet)(April 2005)

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/US05/06522

## Box No. I Basis of the report

1. With regard to the language, this report is based on:

- ☒ the international application in the language in which it was filed.
- ☐ a translation of the international application into English, which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
- ☐ publication of the international application (under Rule 12.4(a))
- ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a))

2. With regard to the elements of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

- ☒ the international application as originally filed/furnished
- ☒ the description:  
pages 1-8 as originally filed/furnished  
pages\* NONE received by this Authority on \_\_\_\_\_  
pages\* NONE received by this Authority on \_\_\_\_\_
- ☒ the claims:  
pages 9-12 as originally filed/furnished  
pages\* NONE as amended (together with any statement) under Article 19  
pages\* NONE received by this Authority on \_\_\_\_\_  
pages\* NONE received by this Authority on \_\_\_\_\_
- ☒ the drawings:  
pages 1/4-4/4 as originally filed/furnished  
pages\* NONE received by this Authority on \_\_\_\_\_  
pages\* NONE received by this Authority on \_\_\_\_\_
- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, Nos. \_\_\_\_\_
- ☐ the drawings, sheets/figs \_\_\_\_\_
- ☐ the sequence listing (*specify*): \_\_\_\_\_
- ☐ any table(s) related to the sequence listing (*specify*): \_\_\_\_\_

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, Nos. \_\_\_\_\_
- ☐ the drawings, sheets/figs \_\_\_\_\_
- ☐ the sequence listing (*specify*): \_\_\_\_\_
- ☐ any table(s) related to the sequence listing (*specify*): \_\_\_\_\_

\* If item 4 applies, some or all of those sheets may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.  
PCT/US05/06522

**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

Novelty (N)	Claims <u>1-19</u>	YES
	Claims <u>NONE</u>	NO
Inventive Step (IS)	Claims <u>2, 3, 8-19</u>	YES
	Claims <u>1, 4-7</u>	NO
Industrial Applicability (IA)	Claims <u>1-19</u>	YES
	Claims <u>NONE</u>	NO

**2. Citations and Explanations (Rule 70.7)**

Claims 1-19 meet the criteria set out in PCT Article 33(4), and thus meet industrial applicability because the subject matter claimed can be made or used in industry.

Claims 2-3, 8-10, 11-16, and 17-19 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest the claimed subject matter.

Claims 4-7 lack an inventive step under PCT Article 33(3) as being obvious over U.S. Pat. 5,667,269 to Prenger et al. in view of an article entitled "Thixomolding: Plastic Injection Molding Turns to Metal" by Stephen LeBeau and Joseph Maffia ("Article").

Prenger discloses a method of making a top stack linkage for a convertible top for a vehicle, comprising: molding magnesium to form various components for the top stack linkage (see Col. 3, lines 16-21); and assembling the front rail portion (2), side rails (3) and links (5) together with a plurality of bows (7) to form the top stack linkage for the convertible top.

However, Prenger does not disclose the molding step is a thixomolding process.

The Article discloses thixomolding magnesium for a variety of applications, including the automotive industry, in order to realize lighter weight components. See page 35. The process is an improvement over ordinary die-casting for a number of reasons, including reducing porosity, providing dimensional stability, and producing near-net shaped components and is environmentally friendly. Id. at page 34.

Regarding claim 1, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have formed the magnesium molded rails of Prenger by a thixomolding process, in light of the teachings of the Article, in order to easily allow for "net-shaped molding of magnesium alloys to produce parts." Id. at page 33.

Regarding claim 4, Figures 2-3 of Prenger show molding fastener bosses

Regarding claim 5, Prenger induces a rear rail (4) and a pressure link (5).

Regarding claim 6, Prenger included central rails (3) and rear rails (4).

Regarding claim 7, Prenger provided a scissor link (30, 36); a control link (15); a pivot link (other links e.g., 21); and a pressure link (5).

----- NEW CITATIONS -----

**INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**

International application No.

PCT/US05/06522

**Box No. VIII Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Claim 10 is objected to under PCT Rule 66.2(a)(v) as lacking clarity under PCT Article 6 because claim 10 does not indicate the claim for which it depends from. It is believed that claim 10 should depend from claim 8.

Claim 19 is objected to under PCT Rule 66.2(a)(v) as lacking clarity under PCT Article 6 because claim 19 lacks proper antecedent basis for the limitation, "center rail" and does not match the preamble of claim 7, from which it depends. It is believed that claim 19 should depend from claim 17.

10/598 382

# Document made available under the Patent Cooperation Treaty (PCT)

International application number: PCT/US05/006522

International filing date: 28 February 2005 (28.02.2005)

Document type: Certified copy of priority document

Document details: Country/Office: US  
Number: 60/548,628  
Filing date: 27 February 2004 (27.02.2004)

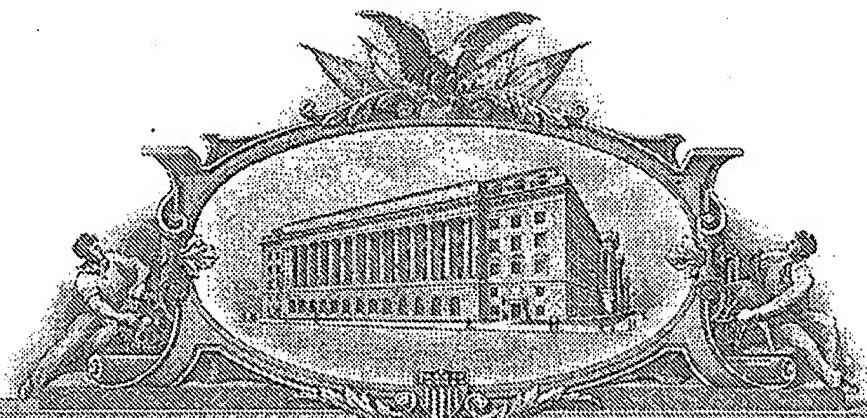
Date of receipt at the International Bureau: 23 March 2005 (23.03.2005)

Remark: Priority document submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b)



World Intellectual Property Organization (WIPO) - Geneva, Switzerland  
Organisation Mondiale de la Propriété Intellectuelle (OMPI) - Genève, Suisse

10/598382



1296964

# THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

March 16, 2005

THIS IS TO CERTIFY THAT ANNEXED HERETO IS A TRUE COPY FROM THE RECORDS OF THE UNITED STATES PATENT AND TRADEMARK OFFICE OF THOSE PAPERS OF THE BELOW IDENTIFIED PATENT APPLICATION THAT MET THE REQUIREMENTS TO BE GRANTED A FILING DATE.

APPLICATION NUMBER: 60/548,628

FILING DATE: February 27, 2004

RELATED PCT APPLICATION NUMBER: PCT/US05/06522



Certified by

*Don W. Duck*

Under Secretary of Commerce  
for Intellectual Property  
and Director of the United States  
Patent and Trademark Office

022704  
17157 U.S. PTO

Use mr li  
PTO/SB/16(10-01)  
Approved for used through 10/31/2002. OMB 0651-0032  
Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

PROVISIONAL APPLICATION FOR PATENT COVER SHEET

TO: Mail Stop Provisional Patent Application  
Commissioner for Patents  
U.S. Patent & Trademark Office  
P.O. Box 1450  
Alexandria, VA 22313-1450

19249 U.S. PTO  
60/548628  
022704

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53 (c).

Atty. Docket No. CTSF 0151 PRV		
INVENTOR(s)		
FIRST NAME & MIDDLE INITIAL	LAST NAME	RESIDENCE (CITY & EITHER STATE OR FOREIGN COUNTRY)
Jan	Just	4845 Bryn Mawr, Bloomfield Hills, MI 48301
Thomas G.	Fischer	2600 Garland, Sylvan Lake, MI 48320
Additional inventors are being named on the _____ separately numbered sheets attached hereto.		
TITLE OF THE INVENTION (500 characters max.)		
CONVERTIBLE TOP STACK HAVING A COMMON PIVOT FOR A PIVOT LINK, CENTER RAIL AND REAR RAIL		
DIRECT ALL CORRESPONDENCE TO:		
CUSTOMER NO. 22045		
ENCLOSED APPLICATION PARTS (check all that apply)		
<input checked="" type="checkbox"/> Specification - Number of Pages 5	<input type="checkbox"/> CD(s), Number _____	
<input checked="" type="checkbox"/> Drawing(s) - Number of Sheets 4	<input type="checkbox"/> Other: Specify _____	
<input type="checkbox"/> Application data sheet. See 37 CFR 1.76.		
METHOD OF PAYMENT OF FILING FEES (check one)		
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27.	PROVISIONAL FILING FEE AMOUNT(S)	AMOUNT SUBMITTED OR TO BE CHARGED TO DEPOSIT ACCT.
<input type="checkbox"/> A check or money order is enclosed to cover the Provisional Filing fees.	\$160.00 (large) \$ 80.00 (small)	\$ 160.00
<input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge filing fees and credit Deposit Account Number: 02-3978		

- ☒ Please charge any additional fee or credit any overpayment in connection with this filing to our Deposit Account No. 02-3978.
- ☒ The invention was not made by an agency of the United States Government or under a contract with an agency of the United States Government.
- ☐ The invention was made by an agency of the U.S. Government or under a contract with an agency of the U.S. Government. The name of the agency is \_\_\_\_\_, and the contract number is \_\_\_\_\_.
- ☒ A return postcard is enclosed.

Respectfully submitted.

SIGNATURE [Signature]  
REGISTRATION NO. 29,805

DATE February 27, 2004  
TYPED or PRINTED NAME Kevin J. Heint  
TELEPHONE (248) 358-4400

CERTIFICATION UNDER 37 C.F.R. § 1.10

I hereby certify that this correspondence is being deposited with the United States Postal Service via Express Mail Label No. EV375983218US in an envelope addressed to: Mail Stop Provisional Patent Application, Commissioner for Patents, U.S. Patent & Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450 on:

February 27, 2004 (Date of Deposit)  
Angelika Phillips (Name of Person Signing)

[Signature]  
(Signature)

## CONVERTIBLE TOP STACK HAVING A COMMON PIVOT FOR A PIVOT LINK, CENTER RAIL AND REAR RAIL

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

5                   The present invention relates to a convertible top stack having a pivot link supporting two bows that shares a common pivot point with a center rail and a rear rail.

#### 2. Background Art

10                   Convertible tops may be provided on vehicles to provide the option of converting a vehicle to an open top configuration. Convertible tops may be extended to cover a passenger compartment and may be retracted to provide an open passenger compartment. Convertible tops have a soft top cover that is supported by a top stack linkage in an extended position. The convertible top may be folded by the top stack linkage and stored in the storage compartment or in the portion of the trunk of the vehicle when it is in its retracted position.

15                   Convertible tops generally comprise structural elements such as the top stack and a plurality of transversely extending bows that support a flexible top cover made of cloth generally having a canvas-like appearance. Convertible tops also generally include a backlight, or window. Convertible tops are relatively complex structures that require fabrication and assembly of many component parts. An objective of convertible top design is to minimize the number of component parts without sacrificing appearance or function.

20                   Each pivot point of a convertible top must be carefully assembled from multiple components that are secured to a pivot pin. When all of the necessary components are assembled to a pivot pin with bushings and washers they are permanently secured with a flaring tool, snap ring fastener, or the like.

Number three and four bows of a convertible top normally require separate links that support and position these bows relative to different parts of the top stack linkage. Each additional linkage increases part count and manufacturing expense required to produce the convertible top.

5                   There is a need for a simplified convertible top structure that minimizes part count and reduces assembly operations necessary to build the convertible top.

These problems and needs are addressed by applicant's invention as summarized below.

10                   BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a side elevation view of a convertible top and top stack linkage made according to the present invention;

FIGURE 2 is a fragmentary, partially exploded perspective view of a top stack linkage made according to the present invention;

15                   FIGURE 3 is a perspective view of a portion of a top stack linkage made according to the present invention; and

FIGURE 4 is a cross-sectional view taken along the line 4-4 in Figure 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

20                   Referring to Figure 1, a convertible top 10 is illustrated including a top stack 12. The convertible top includes a one bow 14 that is adapted to be secured a windshield header 16. Moving rearwardly from the one bow, the other bows of the top stack 12 are identified as a two bow 18, a three bow 20, a four bow 22, and a five bow 24. The bows support the top cover 26 when the convertible top

10 is in its extended, or covering, position. A headliner 28 extends from the one bow 14 to the four bow 22 and is secured to each of the bows except for the five bow 24.

5 The one bow is integrally formed with a front rail portion 30. The front rail portion 30 of the one bow 14 is connected on its rearward end to a center rail 32 and control link 34.

10 The two bow 18 is connected to a scissor link 36. An upper cylinder 38 is connected to the center rail 32 and scissor link 36 on opposite ends. When it is desired to retract the convertible top 10, the upper cylinder 38 retracts causing the scissor link 36 to rotate in a clockwise direction as shown in Figure 1. The scissor link 36 lifts the control link that in turn lifts the front rail portion 30 and one bow 14 off of the windshield header 16. The connection between scissor link 36 and the two bow 18 includes a slot 40 that permits a limited degree of lost motion connection between the scissor link and the two bow 18.

15 The center rail 32 is connected on its rearward end to a pivot link 42 and a rear rail 44 on a triple pivot pin 46. Pivot link 42 is also connected to the control link 34. Pivot link 42 is pivotally connected to each of the three bow 20 and four bow 22. The rearward end of the pivot link 42 is connected to the pressure link 48. Pressure link 48 interconnects the pivot link 42 with the five bow 24. As the pivot link 42 is rotated during the retraction cycle, the pressure link 48 lifts the five bow 24. At the same time, the pivot link 42 moves the three bow 20 and four bow 22 rearwardly.

25 The rear rail 44 is connected on its forward end to the center rail 32 and is attached to the five bow at an intermediate point on its lower portion. The rear rail 44 is also pivoted on its lower end to the main pivot bracket 52.

A main spring 54 is supported on the main pivot bracket 52. The main spring 54 is a power spring used to counterbalance the weight of the convertible top 10 during its extension and retraction cycles. A lower cylinder 56

is also provided as part of the main pivot bracket assembly 52. A balance link 58 is connected to the main pivot bracket assembly 22 and the main spring 54 on its lower end. The upper end of the balance link 58 is connected on its upper end to the center rail 32.

5                   As the top is retracted, the rear rail 44 rotates in a clockwise direction, as viewed in Figure 1, about the main pivot bracket 52. The balance link 58 also rotates in a clockwise direction about the main pivot bracket 52 thereby causing the center rail 32 to rotate upwardly and rearwardly in a generally clockwise direction. As the retraction cycle continues, the one bow 14 rotates over the center  
10 rail 32 and the three and four bows rotate rearwardly toward the five bow 24. Ultimately, the retraction cycle is completed with the bows stacked in the storage compartment located behind the main pivot bracket 52.

Referring to Figure 2, the control link 34 is shown removed from the pivot point that connects the control link 34 to the front rail portion 30 of the one  
15 bow 14 on its front end. The control link 34 is also shown exploded from its pivot point with the pivot link 42. Pivot link 42 is shown connected to the center rail 32 and rear rail 44 at an intermediate point on the pivot link 42. The rear end of the pivot link 42 is shown connected to the pressure link 48. The connection between the main pivot bracket assembly 52, rear rail 44, and balance link 58 are also  
20 illustrated. The main spring 54 exerts a counterbalancing force on the balance link 58 throughout the retraction and extension cycles.

Referring to Figure 3, the connections between balance link 58, main spring 54, and main pivot bracket 52 may be seen in greater detail. The main pivot bracket 52 is connected to the rear rail 44 at the lower end of the rear rail 44. The  
25 balance link is pivoted on a spring mount pivot pin 60 to which the main spring 54 is also mounted. A forked end 62 of the main spring 54 engages the balance link 58 at a point radially spaced from pivot pin 60. The main spring 54 exerts a force on the balance link 58 that assists in lifting the convertible top 10 through the center rail 32 and one bow 14.

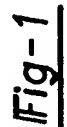
Referring to Figure 4, the triple pivot pin 46 is shown in cross section. The triple pivot pin 46 is journaled by the center rail 32 on opposite ends of the pin 46. The pivot link 42 is also assembled to the center portion of the triple pivot pin 46. The rear rail 44 is secured to the pin 46 between the pivot link 42 and  
5 outer ends of the pin 46 where the pin 46 is connected to the center rail 32.

Figure 4 also illustrates the relationship of the three bow 20 and top cover 26 relative to the center rail 32. The three bow 20 is connected on pivot pin 64 to the pivot link 42.

Several parts of the top stack 12, and also the handle hardware and  
10 latch mechanisms can be formed advantageously with a Thixomolding® process in which Magnesium is heated to its thixotropic state and injection molded to form the parts to net size and shape. The Thixomolding® process allows fastener bosses, reinforcing ribs, class A surfaces and pivot pin retainers to be formed without additional machining operations. In particular, the one bow 14 including the front  
15 rail portion 30, center rail 32, scissor link 36, control link 34, scissor link 36, pivot link 42, rear rail 44, pressure link 48, and end portions of the two through four bows 18, 20 and 22 may all be fabricated using the Thixomolding® process.

While embodiments of the invention have been illustrated and described, it is not intended that these embodiments illustrate and describe all  
20 possible forms of the invention. Rather, the words used in the specification are words of description rather than limitation, and it is understood that various changes may be made without departing from the spirit and scope of the invention.

7



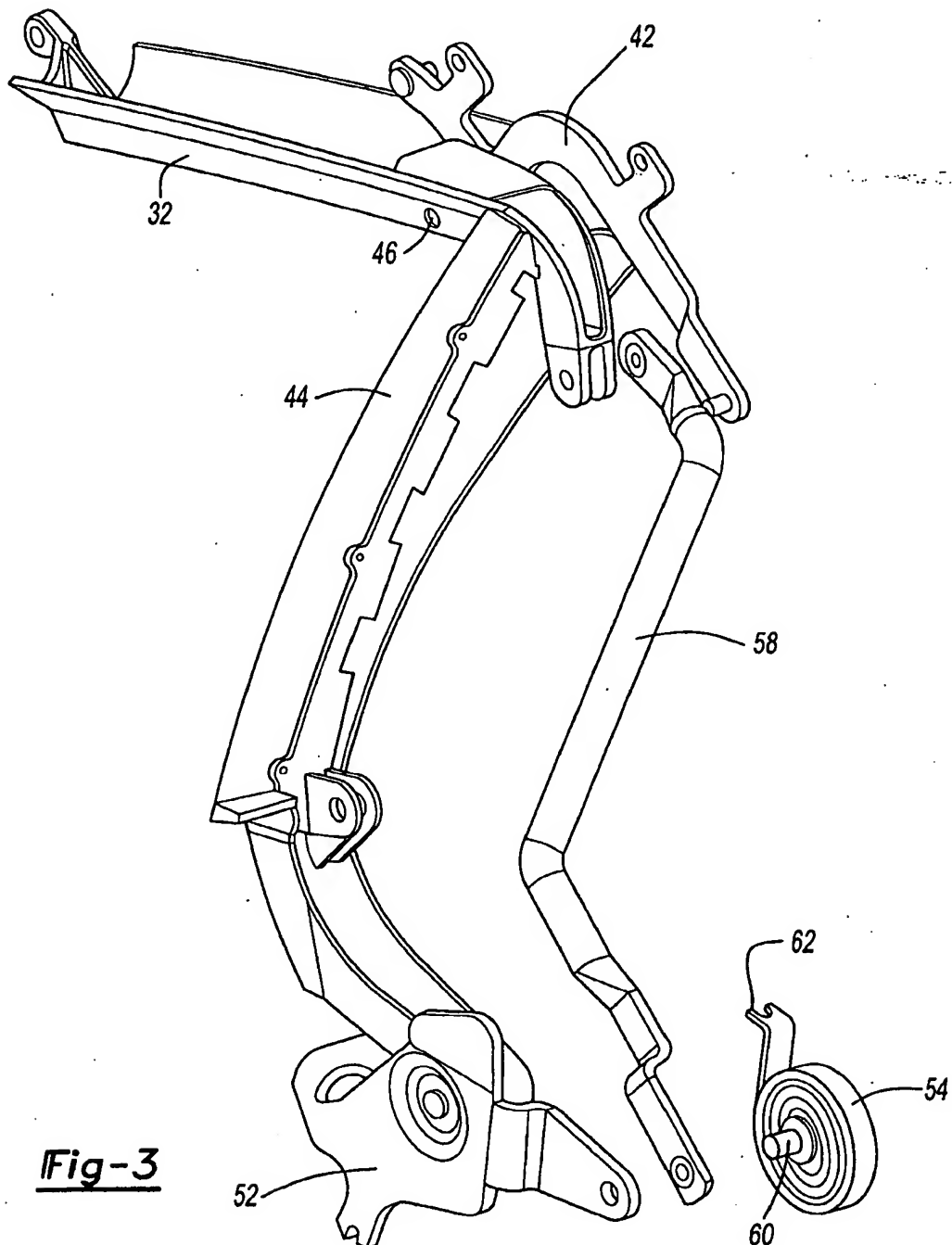
First Named Inventor: Jan Just  
Atty. Docket No.: CTSF 0151 PRV

First Named Inventor: Jan Just  
Atty. Docket No.: CTSF 0151 PRV

Fig-2

Title: CONVERTIBLE TOP STACK HAVING A COMMON PIVOT FOR A PIVOT LINK, CENTER  
RAIL AND REAR RAIL  
First Named Inventor: Jan Just  
Atty. Docket No.: CTSF 0151 PRV

3/4



Title: CONVERTIBLE TOP STACK HAVING A COMMON PIVOT FOR A PIVOT LINK, CENTER  
RAIL AND REAR RAIL

First Named Inventor: Jan Just  
Atty. Docket No.: CTSF 0151 PRV

4/4

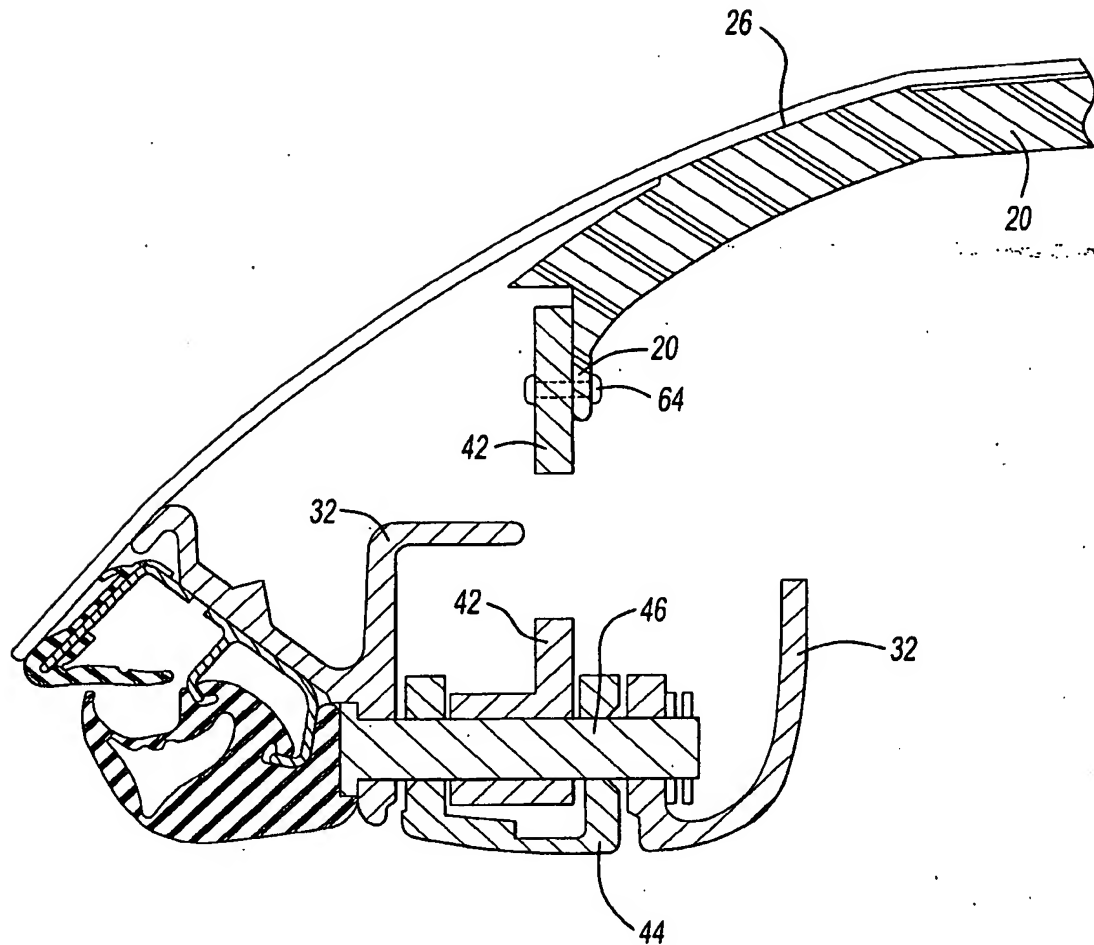


Fig-4

**(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)**

**(19) World Intellectual Property  
Organization  
International Bureau**



**(43) International Publication Date**  
**15 September 2005 (15.09.2005)**

**PCT**

**(10) International Publication Number**  
**WO 2005/084289 A3**

**(51) International Patent Classification<sup>7</sup>:** **B60J 07/12**  
**(21) International Application Number:** **PCT/US2005/006522**

**(22) International Filing Date:** 28 February 2005 (28.02.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
60/548,628 27 February 2004 (27.02.2004) US

(71) Applicant (for all designated States except US): CTS  
FAHRZEUG DACHSYSTEME GMBH [US/US]; 2110  
Austin Drive, Rochester Hills, MI 48309 (US).

**(72) Inventors; and**

(75) **Inventors/Applicants (for US only):** **JUST, Jan** [DE/US]; 4845 Bryn Mawr, Bloomfield Hills, MI 48301 (US). **FISCHER, Thomas, G.** [DE/US]; 2600 Garland, Sylvan Lake, MI 48320 (US).

(74) Agents: HEINL, Kevin, J. et al.; Brooks & Kushman, 1000 Town Center, 22nd Floor, Southfield, MI 48075 (US).

**(81) Designated States** (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

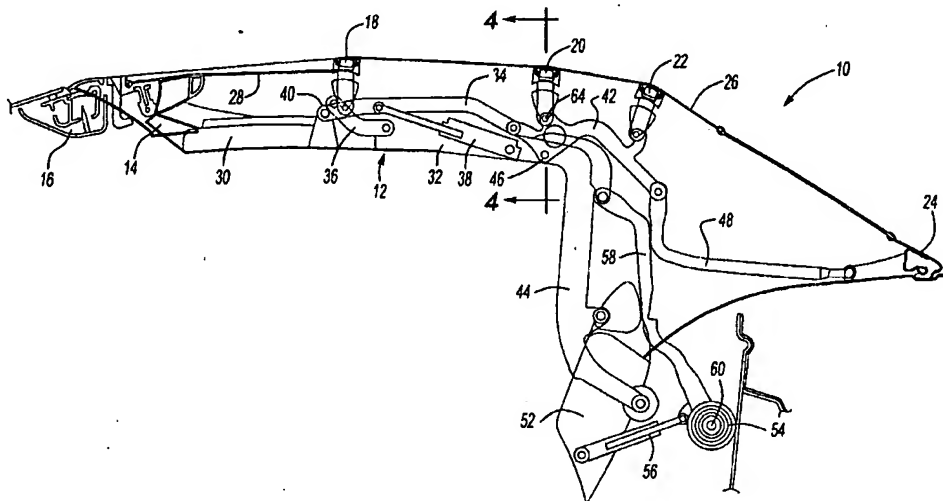
(84) **Designated States** (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Declarations under Rule 4.17:**

— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE,

*[Continued on next page]*

**(54) Title: INJECTION MOLDED MAGNESIUM CONVERTIBLE TOP STACK HAVING A COMMON PIVOT FOR A PIVOT LINK, CENTER RAIL AND REAR RAIL**



**(57) Abstract:** A convertible top stack linkage (12) is provided that is formed, in part, in a thixotropic magnesium molding process. Many structural parts of the convertible top stack linkage (12) may be thixotropically molded. A pivot link (42) of the top stack linkage (12) is provided connected to two bows, for example, the three (20) and four bows (22) of the top stack. A five bow (24) extends between and is attached to right and left pivot links (42) by right and left pressure links (48), respectively. A pivot link (42) is provided that has a triple pivot connection to a tensioning link (58), a center rail (32) and a rear rail (44). A main spring (54) is secured to a pivot pin (60) and connected to a main pivot bracket (52) on the vehicle to provide a counterbalancing force on the balance link (58) that assists in lifting the top stack linkage (12) as the convertible top is retracted and extended.

**WO 2005/084289 A3**



- EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)
- of inventorship (Rule 4.17(iv)) for US only
- Published:**
- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments
- (88) Date of publication of the International search report:**  
20 October 2005
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US05/06522

<b>A. CLASSIFICATION OF SUBJECT MATTER</b> IPC(7) : B60J 07/12 US CL : 296/107.09, 107.16, 108, 117, 134; 29/897.2 According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b> Minimum documentation searched (classification system followed by classification symbols) U.S. : 296/107.09, 107.16, 108, 117, 134; 29/897.2  Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	LEBEAU, S. & MAFFIA, J., Thixomolding: Plastic Injection Molding Turns to Metal. Engineered Casting Solutions, Fall 2002 (2000), p. 33-35.	1, 4-7
---		-----
A		2-3
A	US 2,617,681 A (HAWVER et al) 11 November 1952 (11.11.1952), figure 4.	1-19
A	US 2,970,007 A (HENNESSEY) 31 January 1961 (31.01.1961), col. 2, lines 33-35.	1-7
A	US 3,342,524 A (ADAMSKJ) 19 September 1967 (19.09.1967), figure 2.	1-19
A	US Re. 34,033 E (GODETTE) 18 August 1992 (18.08.1992), figure 6.	1-19
A	US 5,161,852 A (ALEXANDER et al) 10 November 1992 (10.11.1992), figure 14.	17-19
Y	US 5,667,269 A (PRENGER et al) 16 September 1997 (16.09.1997), col. 3, lines 16-21.	1-7
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 02 August 2005 (02.08.2005)		Date of mailing of the international search report 09 SEP 2005
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703) 305-3230		Authorized officer Eric B. Compton Telephone No. (571) 272-4050 <i>Sheila H. Venev</i> Paralegal Specialist Tech. Center 3700